15/160 UX

depending on whether one or the other of relays **10** and **11** receives current by means of photocells **5** and **6**.

By the further displacement of arms **15** and **25** the next five steps will close current circuits either to relay **37** or **38**, **39** or **40**, **41** or **42**, **43** or **44**, **45** or **46**.

If it now be presumed that either line **67** or line **68** is connected to the plus terminal of battery, it will be seen that a current circuit is closed over one of the two sets of relays on magnets **69—100**.

Presuming that in the first set of relays relays **17**, **29**, **32**, **34** and **35** receiving current from [illegible]

over conta[illegible]

springs of [illegible]

67 will be [illegible]

67—101—1[illegible]

109 to line [illegible]

from the rig[illegible]

111, the line [illegible]

cal order to [illegible]

ing from th[illegible]

Thus rela[illegible]

26th relay c[illegible]

relays of the [illegible]

are under c[illegible]

sets corresp[illegible]

connected w[illegible]

94 through [illegible]

The said [illegible]

may be actu[illegible]

releasing o[illegible]

machine.

Presumin[illegible]

upper part [illegible]

in the lowe[illegible]

cording cha[illegible]

the said rela[illegible]

receive cur[illegible]

photocell **6** [illegible]

is activated [illegible]

whereupon [illegible]

6 remains n[illegible]

The five i[illegible]

spond to the [illegible]

photocell **5** i[illegible]

ing the two [illegible]

nets **17** and [illegible]

the third i[illegible]

as to suppl[illegible]

be connecte[illegible]

and **106**.

In case [illegible]

fourth impu[illegible]

nected with [illegible]

connected [illegible]

5 is now ac[illegible]

113 will be c[illegible]

which is co[illegible]

Line **115** is [illegible]

relay **96**.

On Fig. 1 [illegible]

illustrated by means of the type indicated with the word "switch." Relay **96** consequently is not connected with any particular type arm but releases and operates a contact set for cable **111**, whereby the lines, after the operation of said relay, are disconnected from the coils of magnets **69—100** and connected with other magnets. This may be up to **31** for the operation or releasing of other type arms or functions of a typewriting machine in case the 32 types illustrated on Fig. 1 should also be used for other type arms of functions of the typewriting machine.

In accordance with the embodiment forming the basis for circuit diagram on Fig. 6, the interpretation of the type characters is supposed to be transmitted to the type arms of an ordinary typewriting machine. The operation of any particular type arm also causes a stepwise movement of a contact wheel whereby contacts such as **19** and **55** as well as **117** and **118** are actuated.

The depression of any particular type key as well as the space key (the bar in front of the keyboard) as it is known releases the progression device of the typewriting machine whereby the carriage of the machine is moved one step when [illegible]ed and the type arm [illegible]tion.

[illegible]nderstood that besides [illegible] movements may also [illegible]ssion of a key. Thus [illegible]may in a known man-[illegible]eir respective ratchet [illegible]noved one step by the [illegible]

[illegible] trailing arms in such [illegible]re in engagement with [illegible]d ratchet pawls, there [illegible] of notches or bosses [illegible] movement, whereby [illegible]ned or in some cases [illegible]ng the stepwise pro-[illegible]

[illegible]nd **118** indicate such [illegible]means of disks **20**, **119** [illegible]wise progression con-[illegible]m a notch to the top [illegible]cint of the arm which [illegible]pring **122** when wheel [illegible] will engage contact [illegible] progression of contact [illegible]ause the plus terminal [illegible] at every second step [illegible]termediate steps with [illegible]

[illegible] manner actuates the [illegible]moved from notch to [illegible] progression whereby [illegible] short contact closing, [illegible]s closed from the plus [illegible]iler **118** and relay **123** [illegible]f which is connected [illegible]f battery. Relay **123** [illegible]r each step of move-[illegible].

[illegible]vided with small teeth [illegible] pass trailing arms **19** [illegible]ir passage so that the [illegible]hich are ordinarily [illegible] a short period during [illegible]rs from the figure the [illegible]at such distance from [illegible]acts are interrupted [illegible]sk **20** moves clockwise, [illegible]ement of contact arm [illegible] during the next step. Accordingly the selfclosing current circuits for the two sets of relays are interrupted alternately.

Before the sequence of operation is described the synchronizing device for the paper ribbon from which the photocells receive their impulses, will be described with reference to Fig. 5. By means of relay **123** the movement of the paper ribbon is made dependent on the speed of operation of the typewriting machine.

Paper ribbon **124** is supposed to be moved in the direction of the arrow movement taking place at uniform speed past the photocells for instance

by means of a spring motor. The movement of the paper ribbon is transmitted to drum **125** on shaft **126**. The movement of shaft **126** is transformed as indicated diagrammatically on Fig. 5 by means of gears **127**, **128** to selector devices **15** and **25**.

On sleeve **129** which is loosely mounted on shaft **126** is secured ratchet wheel **130** which is adapted to be released stepwise by means of magnet **123**. Sleeve **129** is connected with shaft **126** by means of a spiral spring (not shown) which is wound by the rotation of shaft **126** when sleeve **129** is maintained in its position by means of pivot **131**.

When shaft **126** has performed a rotation corresponding to a movement of paper ribbon **124** caused by the impulse steps for up to characters, that is in the present case ten impulse steps, the spiral spring will be completely wound so that shaft **126** can not be moved any further, whereby the movement of ribbon **124** stops being kept in position by pawl **131**. In case magnet **123** receives an impulse ratchet wheel **130** is released.

The spiral spring connecting shaft **126** and ratchet wheel **130**, moves the latter one step whereupon the ratchet wheel is again stopped by pawl **131**, whereas shaft **126** is now free to rotate. The released spiral spring will again be wound until the whole stops again and is held by pawl **131** unless magnet **123** receives an impulse during this period. In this case paper ribbon **124** is moved evenly and uniformly.

The sequence of operations during the interpretation process in connection with the embodiment illustrated by diagram on Fig. 6 shall now be described.

It is presumed that ribbon **124** has been placed in front of the photocells so that the interpretation impulse of the first type is situated under the photocell combination, whereas at the same time the selector arms **15** and **25** are in their initial position.

Pawl **131** keeps the whole system locked. The carriage of the typewriting machine is now adjusted to one step in front of the place where the first type is to be printed. The battery which is adapted so as to be easily connected and disconnected is now supposed to be connected. A pressure on the space key (the bar) places the typewriting machine in operative position, whereas at the same time disks **20**, **119** and **120** are moved one step. Disk **120** thereby transmits an impulse to relay **123** and paper ribbon **124** starts its uniform movement, the photocells receiving the five first writing impulses for the first type.

These writing impulses as described above are transmitted to the first set of relays, comprising relays **17**, **27**—**36**. Neither more nor less than five relays in the above mentioned set must be closed and these will remain closed, being maintained by means of the selfclosing circuit over line **21**. As contact arm **117** is now connected with spring **121**, the current circuit will be closed from the plus terminal of battery over line **67** to cable **111** and one of relays **69**—**100** for printing of the type corresponding to the character interpreted.

The paper ribbon **124** continues its uniform movement as the spiral spring between sleeve **129** and ratchet wheel **130** permits a movement of up to 10 type impulses before it is completely wound. Consequently the selector arms continue their movement from the sixth to the tenth step, current circuits over the relays in set **37**—**46** corresponding to the next character being closed.

During this continued interpretation one of the magnets under the typewriting machine is actuated whereby the type first interpreted is printed and the disks **20**, **119** and **120** are moved one step. Magnet **123** receives an impulse by means of which the spiral spring between sleeve **129** and ratchet wheel **130** is again released so that the paper ribbon **124** may continue its uniform movement.

Simultaneously with the impulse to locking magnet **123** contact arm **19** is moved, whereby the relays in line **21** of the first contact set are cut out and all closed magnets are demagnetized. Further contact arm **117** is moved from contact spring **121** to contact spring **122**, whereby as soon as five of the magnets **37**—**46** in the second contact set have received current, the corresponding magnet in set **69**—**100** is energized in order to actuate the corresponding type of the typewriting machine.

The contact wheels are hereby moved another step whereby the magnets in the second contact set are cut out whereas the current circuit of the contacts in the first contact set will be closed as soon as five magnets in this set have again received current etc. In this manner the time necessary for moving a type against the cylinder of the typewriting machine as well as for moving the carriage one step to interpret the impulses produced by the next type is utilized.

The process of interpretation in accordance with the above mentioned process will take place with high velocity. In the case of an error in interpretation, for instance by the simultaneous illumination or non-illumination of both photocells, the five relays for the corresponding contact set will not be closed and no current circuit will be closed to one of magnets **69**—**100**, whereby the interpretation process is interrupted.

Fig. 7 illustrates the manner in which a composite special type may be adjusted in connection with the key-board of a typewriting machine.

The special type is here composed of five pivoted type arms one of which is shown and indicated with **132**. Each of the type arms **132** is provided with an element for perforation or blackening so that they are adapted by adjustment transversely to the direction of reading to form a complete type of the kind illustrated on Fig. 1.

The levers **132** are pivoted on trunnions **133** on levers **134** adapted to pivot about stationary trunnions **135**. A spring **136** maintains the type arms **132** in their left hand position against a stationary stopper **137**.

Levers **134** are connected by means of links **138** with levers **139**, pivoted on stationary trunnions **140**. Levers **139** are arranged in pairs, one pair for each of levers **134** being located on each side of the key-board and the free ends of these pairs are interconnected by means of cross bars **141** so as to form a number of U-shaped hoops which are all pivoted on the stationary trunnion **140**. The cross bars **141** for each of the U-shaped hoops corresponding to the several levers **134** and **132**, are provided with notches so as to be actuated by the depression of the several keys **142** in case there is no notch in the cross bar **141** directly below said key.

The depression of a particular key will therefore move one or more of levers **134**, **132** into the position indicated in dotted lines and contact or perforating members of said arm **132** will then